WATERSPOUTS VISIT TATOOSH ISLAND, WASH.

By R. C. MIZE, Observer.

[Weather Bureau Office, Tatoosh Island, Wash., Jan. 10, 1918.]

Several small waterspouts were visible at sea, bearing south to northwest from Tatoosh Island, Wash., between 11:45 a. m. and 12:10 p. m. December 1, 1917. The greatest number observed at any one time was six.

A spout was first observed 2 miles southwest of the station at 11:56 a. m.; came within 200 yards of it six minutes later. During that time there was a gentle southerly breeze with a light flurry of moist snow. The sky was overcast with very dark nimbus clouds, all apparently moving from the southwest. The barometer rose from 29.63 to 29.67 inches in six minutes during the approach of this disturbance. There was no lightning. Some observers noted a slight roaring noise. The waterspout moved almost directly northeastward at the rate of 20 miles per hour until it reached the outer rocks, then swerved toward the north and headed directly for the Tatoosh Island lighthouse. Reaching the west side of this island, where the cliff is overhanging with a height of about 95 feet, the waterspout abruptly disappeared at 12:02 p. m. without any evidence of its presence upon the top of the island. It appeared to whirl counter-clockwise, as evidenced by the movement of the funnel cloud and spray. The diameter of the funnel cloud was apparently less than 20 feet, except near its upper extremity where it widened rapidly. The width of its path was about 50 feet and width of the core 5 feet. Heavy spray was thrown to a height of 20 feet, and lighter spray 80 feet or more.

METEOROLOGY OF GREENLAND'S INLAND ICE AND ITS FOEHN.[1]

By A. DE QUERVAIN.

(*Abstract of* paper presented to Swiss Society of Geophysics, etc., Zurich, Sept. 11, 1917.)

As the discussion of the observations by the Swiss expedition to Greenland is approaching completion, it has seemed proper to communicate these definite results which include the first observations made in summer and based on a complete traverse.

The communications have related chiefly to the thermal conditions (central region, daily amplitude, comparison with the fall observations by Nansen); to the régime of the winds with its pronounced diurnal variation; and finally to the annual growth of the inland ice and its probable evaporation during the summer.

The observations made while crossing Greenland, for the first time permit us to establish the fact that in some cases when a föhn is observed on the coast and on the inland ice it must be a wind descending from somewhat in the interior if not indeed quite from the summit line itself of the inland ice.

More ample details will be found in the full report to be published at an early date in the Mémoires de la Société helvétique des Sciences naturelles, volume 53.

551.324 (048)

VARIATIONS OF ALPINE GLACIERS.

[*Reprinted from* Nature, London, Jan. 3, 1918, 100: 350.]

Prof. P. L. Mercanton, in "Revue générale des Sciences" for November 30, 1917, discusses the results of the more recent observations on the advance and retreat of glaciers, particularly Alpine. Systematic work was begun by Prof. Forel 37 years ago in the Swiss Alps, and for at least 30 of them the movements of the Rhone Glacier and the two at Grindelwald, have been carefully noted. Those on the northern side of Mont Blanc have also been studied, and similar work is now being carried on in other ice fields. But the main advances and retreats of those glaciers and a few others in the Alps, are known for fully three centuries and estimates of their periods have been attempted. These do not correspond with Wolf's 11-year period, or with the 35-year one of Brückner. Some causes affect their movements, other than the snowfall in the upper region or névé and the ablation due to temperature changes in the lower; for of two adjacent glaciers, one may be advancing while another is retreating. Recent observations, as Prof. Mercanton points out, indicate that the volume and the length of a glacier can to some extent vary independently, or, in other words, that the ice moves down a valley from the more expanded névé basin at its head, not with perfect uniformity, but with local intermittance, so that a belt near the end may be swelling up in a wide mound and thus the actual volume of ice be increasing, while the end itself is in retreat. Prof. Mercanton observes that the subject of glaciers and their history is not yet exhausted.

551.324 : 551.573

AQUEOUS EXCHANGE BETWEEN THE NÉVÉ AND THE ATMOSPHERE.[2]

By R. BILLWILLER.

(*Abstract of* paper presented to Swiss Society of Geophysics, etc., Zurich, Sept. 11, 1917.)

Many glaciologists have in the past occupied themselves with the question whether the Alpine glaciers and névés condense some of the water vapor in the atmosphere or, on the contrary, contribute water to the atmosphere by evaporation. The admirable study by Charles Dufour and F.-A. Forel[3] has not settled the question, nor rendered useless new and precise measurements. On the contrary it is important to resume the problem in the light of more extended and more conclusive experiments than theirs. It seems that Dufour and Forel overestimated the frequency and quantitative importance of condensation, basing their conclusions on the results of 15 days of observations made at the height of summer and at the front of the Rhone Glacier, i. e., under conditions of place and time most favorable to an energetic condensation.

The frequency of condensation or evaporation at a given location is best determined from regular observations on the temperature and the humidity of the air and of the temperature of the snow surface. I hope to be able to study the conditions of the Säntis from this standpoint.

The quantity of water condensed or evaporated is determined by weighing. For this purpose I have at present a special balance built after specifications of Prof. Dr. A. Picard, and conveniently carried in the satchel. It has functioned very nicely and so far has furnished the following determinations:

October 14 and 15, 1916, there was uninterrupted evaporation during 24 hours on the Säntis; the maximum was 0.071 mm. per hour, between 7^h and 8^h.

[1] *A. de Quervain* (Zurich). Sur la météorologie de l'inlandsis du Grönland et en particulier sur le föhn de l'inlandsis. Arch. des sci. phys. et nat., Genève, 15. Nov. 1917, 44.

[2] *R. Billwiller* (Zurich). L'échange aqueux entre l'air et le névé. Arch. des sci. phys. et nat., Genève, 15. Nov. 1917, 44: 338-339.

[3] *Dufour & Forel.* Recherches sur la condensation de la vapeur aqueuse de l'air au contact de la glace et sur l'évaporation. Bull., Soc. vaudoise des sci. nat., Lausanne, 1871, 10: 621-684.

January, 1917, a very interesting series of 8 days toward the close of the month, on the Schatzalp (above Davos) gave the type of aqueous exchange under the régime of a calm winter anticyclone. During the night, by reason of the considerable fall in temperature of the snowy surface, a slight condensation intervened (e. g., night of Jan. 22–23, a mean of 0.007 mm. per hour); but from sunrise to sunset a many times larger amount evaporated (e. g., on Jan. 23 = 0.036 mm. per hour).

On the other hand I have determined persistent condensation on the Saint-Gothard during the summer weather of May, 1917, a period when—during the warmest hours—there was equilibrium between the vapor pressure of the air and of the snow bed, but where condensation always prevailed when this did not obtain; the maximum was 0.110 mm. per hour in the night of May 25–26 and during a strong north wind. Of course, the special conditions in the col (high wind with accentuated vertical component) increased the condensation as compared with other stations.

The complete observations will be published and discussed elsewhere.

551.58

USE OF MONTHLY MEAN VALUES IN CLIMATOLOGICAL ANALYSIS.

By E. G. BILHAM.

(*Abstract of* paper presented before the Royal Meteorological Society, London, Dec. 19, 1917.)

[*Reprinted from* Nature, London, Dec. 27, 1917, 100: 340.]

The objects of the paper are (1) to determine to what extent computations based on calendar monthly mean values are vitiated by the fact that the latter are of unequal length; and (2) to provide means of applying numerical corrections on account of errors arising from this cause.

The mean month is defined as an exact one-twelfth division of the year, or 30.437 days, and that period is used as the standard to which the results derived from the actual months are reduced. The matter is of special interest in connection with the computation of Fourier coefficients to represent the seasonal variations of a meteorological element such as temperature. Regarding the year as a cycle of 360°, errors arise from the fact that the monthly mean values will in general differ by small amounts from the ordinates of the curve corresponding with 15°, 45°, etc. The corrections to be applied to the original monthly means and to the Fourier amplitudes have been determined. The use of these corrections is suggested as an alternative to the employment of 5-day means in cases where special accuracy is required.

551.508.5

BATHYRHEOMETER AS ANEMOMETER.

Y. Delage describes in the Comptes Rendus of the French Academy of Sciences,[1] experiments looking toward the adaptation of his bathy-rheometer to the purposes of the anemometer. The bathy-rheometer consists essentially of a staff about a meter in length carrying at its upper free end two metal plates mutually perpendicular and of areas sufficient to perform the work expected of them; while the lower end of the staff is attached to a gimbal support, is heavily counterweighted, and probably will be provided with a damping device to counteract the tendency of the staff to vibrate in the rare atmosphere under the influence of wind puffs. One of the two metal plates or fins acts as the tail of a windvane, being attached by one edge longitudinally to the top of the staff. The fin perpendicular to the vane-fin is set at an angle of 45° with the axis of and sloping upward away from the staff. Its reaction against the horizontal or inclined air currents tends to depress the staff to a definite amount depending on the velocity of the wind. The orientation and the amount of depression of the staff are recorded by suitable mechanisms linked to the counterweight.

M. Delage designed this instrument to measure and record aqueous motions associated with wave phenomena, and was led to apply it to anemometry by the suggestion of Bayeux who thinks that the device is better adapted to anemometric work in high localities than the usual windmill type of instrument, which frequently loads up with rime and glaze until it can not function. It would seem, however, that the adapted bathy-rheometer is equally liable to give false indications, though some kind of a record will undoubtedly be secured. It is the experience of the Weather Bureau that the tails of the standard windvane, equally with the cup arms of the Robinson anemometer, are subject to loading up heavily with rime and glaze under certain American weather conditions. This would certainly happen to the fins of the bathy-rheometer also, under such weather conditions, thereby giving a temporary "set" to the staff with its overhanging fins, and certainly modifying temporarily the fundamental angle of inclination of the inclined fin.

Furthermore, Delage himself has recently found and, to a certain extent, discussed[2] another source of error inherent to the instrument whether immersed in water or air, viz, vortex movements which are intensified in the stronger currents and cause an erratic registration. On the records by the instrument "these abnormalities appear as parasitic curves which are hard to distinguish" and a mechanism for reducing the disturbing vortex movements has not yet been perfected.

In the first of the two papers cited the author describes and illustrates the meteorological application of his device and works out some formulæ for interpreting its records.—C. A., jr.

NITRITES FROM NITRATES BY SUNLIGHT.[3]

By Prof. B. MOORE.

(*Abstract of* paper presented before the Royal Society, London, Dec. 13, 1917.)

[*Reprinted from* Nature, London, Dec. 27, 1917, 100: 338.]

Dilute solutions of nitrates exposed either to sunlight or to a source of light rich in light-energy of short wavelength (such as light from a mercury vapor arc inclosed in silica) undergo conversion of nitrate into nitrite. There is an uptake of chemical energy in this reaction transformed from light energy, as in the formation of organic carbon compounds in foliage leaves; it is to be added to the relatively small number of endothermic reactions induced by light. When green leaves are immersed in nitrate solution comparatively little nitrite accumulates, indicating that nitrites are rapidly absorbed by the green leaf. Nitrates taken up by plants from soil would, in presence of sunlight, be changed to nitrites, which are much more reactive than nitrates. This indicates that the early stages of synthesis of nitro-

[1] *Delage, Yves.* Utilisation du bathyrhéomètre pour l'anemométrie dans les régions froids. Comptes Rendus, Paris, 12. nov. 1917, 165, 659-666.

[2] Delage, Y., *in* Comptes rendus, Paris, Aug. 20, 1917, 165: 277-283.

[3] *Moore, B.* The formation of nitrites from nitrates in aqueous solution, by the action of sunlight and the assimilation of the nitrites by green leaves in sunlight.